More Algebra:

Variable:	Equation:
v_{ix}	$\Delta x = v_{ix}t + \frac{1}{2}a_x t^2$
t_i	$F(t_f - t_i) = m(v_f - v_i)$
m	$Fd = \left(\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2\right) + \Delta U_g$

for v_{ix}

$$\Delta x = v_{ix}t + \frac{1}{2}a_x t^2$$

$$v_{ix}t = \Delta x - \frac{1}{2}a_x t^2$$

$$v_{ix} = \frac{\Delta x - \frac{1}{2}a_x t^2}{t}$$

$$= \frac{\Delta x}{t} - \frac{1}{2}a_x t$$

for t_i

$$F(t_f - t_i) = m(v_f - v_i)$$

$$t_f - t_i = \frac{m(v_f - v_i)}{F}$$

$$t_i = t_f - \frac{m(v_f - v_i)}{F}$$

$$= \frac{m(v_f - v_i) - Ft_f}{-F}$$

for m

$$Fd = \left(\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2\right) + \Delta U_g$$

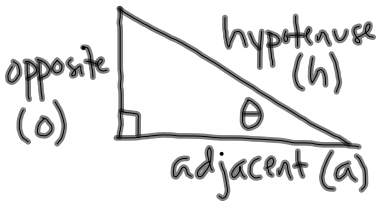
$$\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2 = Fd - \Delta U_g$$

$$m\left(\frac{1}{2}v_f^2 - \frac{1}{2}v_i^2\right) = Fd - \Delta U_g$$

$$m = \frac{Fd - \Delta U_g}{\frac{1}{2}v_f^2 - \frac{1}{2}v_i^2}$$

Triangles:

- Right triangles



θ → Greek letter stands for angle

Sine → relates the angle, opposite side, and the hypotenuse

$$\sin\theta = \frac{o}{h}$$

$\sin(0°) = 0$

$\sin(90°) = 1$

Cosine → relates the angle, hypotenuse and adjacent side

$$\cos\theta = \frac{a}{h}$$

$\cos(0°) = 1$

$\cos(90°) = 0$

Tangent → relates angle, opposite side, and adjacent side

$$\tan\theta = \frac{o}{a}$$

$\tan(0°) = 0$

$\tan(90°) =$ undefined

SOHCAHTOA

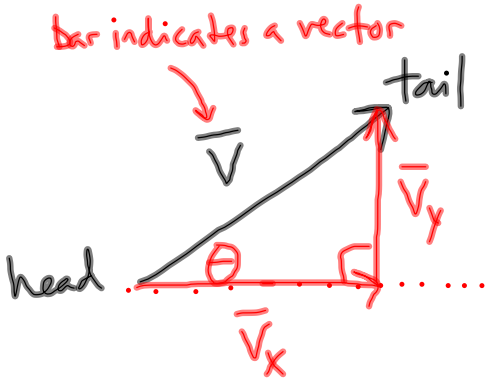
Vectors and Scalars:

- Vector → quantity that has both magnitude and direction
- Scalar → quantity that has only magnitude
- Examples:

Vector	Scalar
velocity	speed
force	mass
displacement	volume
acceleration	time
	distance
	resistance
	energy

- Other difference:
  - For vectors, we must state which direction is positive and which one is negative → so +/− means direction
  - For scalars, +/− means an increase or decrease

Drawing Vectors:

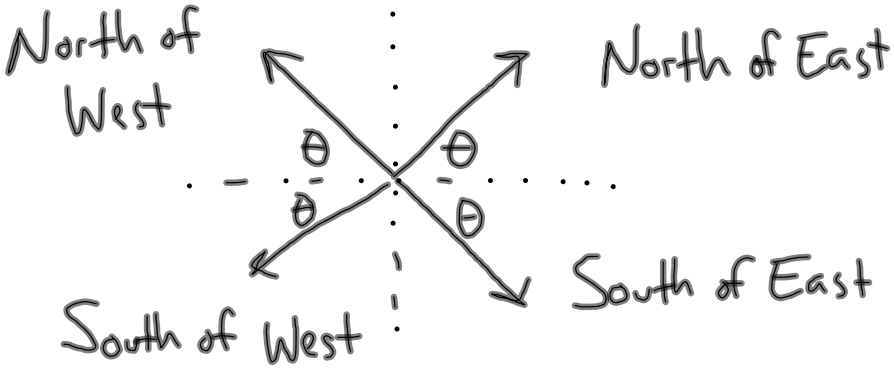


$$\sin\theta = \frac{|\bar{V}_y|}{|\bar{V}|}$$

$$\cos\theta = \frac{|\bar{V}_x|}{|\bar{V}|}$$

$$\tan\theta = \frac{|\bar{V}_y|}{|\bar{V}_x|}$$

- always measure angle from horizontal



- To get the magnitude part of a vector → $|\bar{V}| = V$